

### Trend Study 16C-2-97

Study site name: Willow Creek .

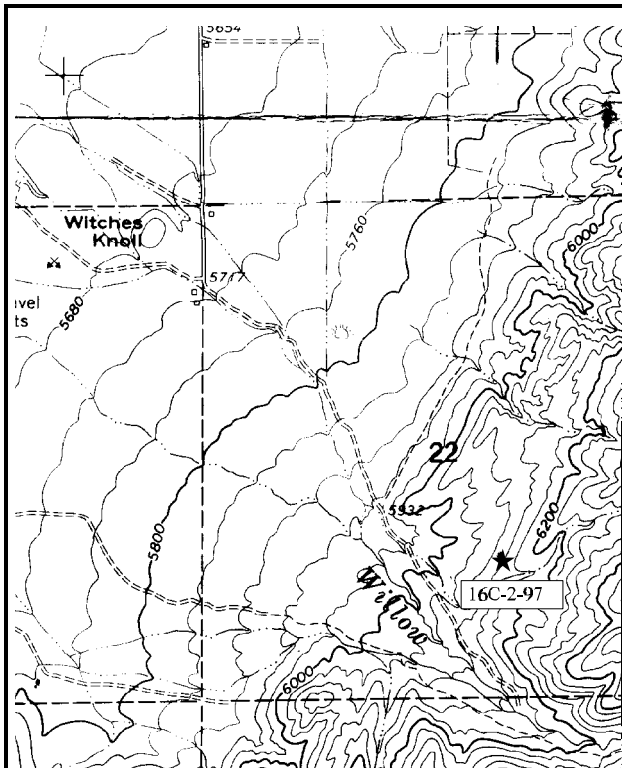
Range type: Chained, cabled reseeded P.J.

Compass bearing: frequency baseline 210M degrees.

First frame placement on frequency belts 5 feet. Frequency belt placement; line 1 (11 & 95ft), line 2 (34ft), line 3 (59ft), line 4 (71ft).

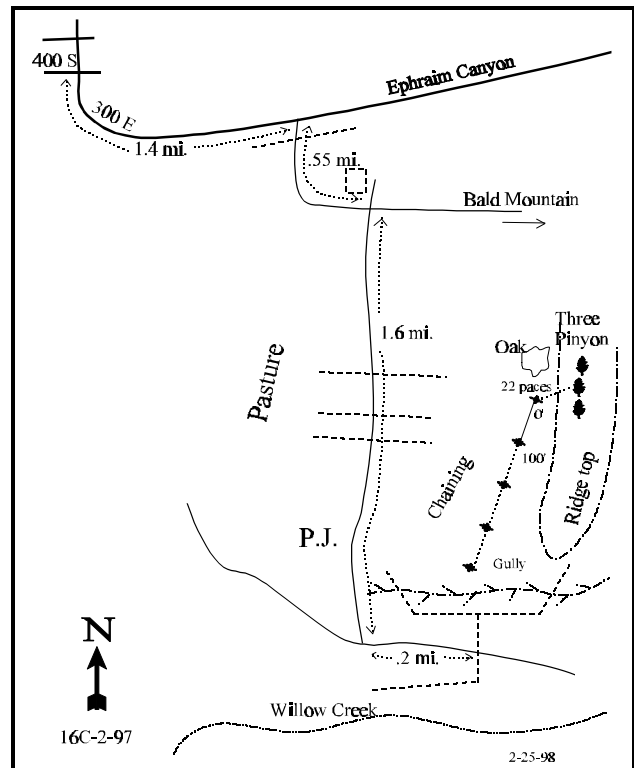
### LOCATION DESCRIPTION

From the intersection of 400 S. and 300 E. in Ephraim, take 300 East south for 1.4 miles, (making a 90° turn), to the Bald Mountain road. Take the Bald Mountain road south and east for 0.55 miles to an intersection. Turn south and go 1.6 miles along the foothills to an intersection just north of Willow Creek. Turn left (east) and go 0.2 miles to a fence corner on the left side of the road. Park here. Cross the fence, cross the gully and go up the white shale ridge to the northeast. From the gully, go about 188 paces to a high point on the ridge where 3 large pinyons grow. Enroute you will pass the 400-foot stake which is near the ridge-top. The O' baseline stake, however, is 22 paces downhill from the 3 pinyons just south of an oak clump.



Map Name: Ephraim .

Township 17S, Range 3E, Section 22



Diagrammatic Sketch

UTM 4352134.543 N, 451190.536

## DISCUSSION

### Trend Study No. 16C-2 (29-2)

The Willow Creek study is located within a chaining on the lower slopes of Bald Mountain, southeast of Ephraim. It is located near the top of a low ridge with a western aspect and moderately steep slope of 35%. Elevation is 6,150 feet. The Bald Mountain 700 acre treatment and seeding was completed in 1969. Sheep grazing has been part of a special study and there is some trespass, but overall livestock use of this Division land is light. There is abundant sign of wintering big game, especially deer.

The soil is a well-drained, shallow, shaley clay loam of the Atepic-Badland Association. The substratum is a layer of very strongly calcareous shaley silty clay loam. Runoff is usually rapid and the hazard from erosion is severe. It is classified as an Upland Shallow Shale (Juniper-Pinyon) range site. There were moderately large patches of bare soil (28% cover) and rock-pavement cover (17%) in the past, presently percent bare soil is down to about 19% with rock-pavement cover showing no change. Litter and vegetative cover were not uniform. The gullying and sheet erosion are normal for this soil. Currently, percent bare soil is moderately low with a more protective and uniform cover of vegetation and litter.

Browse diversity is relatively high for a chained area. Although the most numerous species tend to be less desirable increasers such as broom snakeweed, low rabbitbrush, and juniper, there are a significant number of valuable winter browse species. The most common was bitterbrush, numbering approximately 533 plants/acre in 1989. It had a population of mostly mature, heavily hedged, but vigorous shrubs. Now they number 840 plants/acre with increased vigor and none classified as decadent. Found in lesser numbers are true mountain mahogany, mountain big sagebrush, rubber rabbitbrush, cliffrose, green ephedra, and serviceberry. A majority of the shrubs sampled are mature with moderate to heavy hedging. There are scattered clumps of oakbrush through the area. The point-centered quarter method estimated a tree density similar to that determined by the density plots, 150 juniper/acre and 66 pinyon/acre. Populations of all browse appear to be stable or slowly increasing.

Grasses are abundant. Seeded species, especially the wheat grasses and wildrye, dominate the understory. Grass sum of nested frequency and quadrat frequency were moderately high in 1989, but now have noticeably decreased for crested wheatgrass, intermediate wheatgrass, and Russian wildrye. The grasses are large and vigorous with abundant litter, but the bunch grasses do not provide as much soil protection as rhizomatous species.

Forbs were thought to be an important vegetative component in the past, but now they only provide 19% of the herbaceous cover and almost 50% of that is contributed by bur buttercup. Alfalfa is the second most productive forb, second to bur buttercup.

### 1989 APPARENT TREND ASSESSMENT

This chaining hardly looks 20 years old. Juniper release and/or reinvasion has been slow. There is a vigorous, diverse stand of browse and also a fairly productive herbaceous understory. Overall, the site appears to have a stable trend with a desirable mix of vegetation. Considering the soil limitations of this site, the seeding was quite successful and a beneficial conversion from a predominately juniper community. However, the soil trend is downward due to continued erosion.

## 1997 TREND ASSESSMENT

The trend for soil is now improving with a noticeable lower value for percent bare soil for the site. With 56% of the total vegetative cover coming from herbaceous species, this composition gives much better protection from high intensity summer storms. There is a good mixture of shrubs, but all together they only contribute to about 50% of the total browse cover. The two most abundant preferred species are bitterbrush and true mountain mahogany, which both have improving trends. The trend for the herbaceous understory is stable. Perennial grass sum of nested frequency has remained fairly stable. Over 40% of the of the herbaceous cover is contributed by a noxious weed that is an allelopathic winter annual (bur buttercup).

### TREND ASSESSMENT

soil - up (improving)

browse - up, improving for the two preferred species

herbaceous understory - stable, but a large proportion of the composition is characteristically weedy in habit

### HERBACEOUS TRENDS --

Herd unit 16C , Study no: 2

Type	Species	Nested Frequency		Quadrat Frequency		Average Cover % '97
		'89	'97	'89	'97	
G	Agropyron cristatum	190	*116	78	48	4.50
G	Agropyron intermedium	159	*122	60	46	2.95
G	Agropyron spicatum	20	32	7	15	2.37
G	Bromus inermis	8	9	4	4	.04
G	Bromus tectorum (a)	-	92	-	31	1.39
G	Elymus junceus	17	9	9	5	.90
G	Festuca ovina	40	35	17	15	1.71
G	Oryzopsis hymenoides	6	*37	3	17	.65
G	Poa secunda	31	*84	13	32	1.50
G	Sitanion hystrix	-	2	-	1	.01
Total for Grasses		471	538	191	214	16.05
F	Agoseris glauca	-	3	-	1	.03
F	Alyssum alyssoides (a)	-	118	-	49	.34
F	Astragalus utahensis	-	*13	-	5	.34
F	Balsamorhiza sagittata	-	5	-	3	.02
F	Camelina microcarpa (a)	-	6	-	2	.01
F	Chaenactis douglasii	-	*8	-	4	.02
F	Cirsium spp.	1	-	1	-	-
F	Convolvulus arvensis	3	8	1	3	.06

Type	Species	Nested Frequency		Quadrat Frequency		Average Cover % '97
		'89	'97	'89	'97	
F	Cryptantha spp.	-	4	-	2	.18
F	Cymopterus spp.	-	2	-	1	.00
F	Descurainia pinnata (a)	-	4	-	2	.01
F	Machaeranthera canescens	-	4	-	2	.06
F	Medicago sativa	33	*16	14	7	.78
F	Microsteris gracilis (a)	-	9	-	4	.02
F	Petradoria pumila	-	1	-	1	.03
F	Phlox hoodii canescens	4	9	2	3	.18
F	Phlox longifolia	3	6	1	3	.01
F	Ranunculus testiculatus (a)	-	183	-	65	1.70
F	Tragopogon dubius	-	5	-	2	.06
Total for Forbs		44	404	19	159	3.88

\* Indicates significant difference at  $\alpha = 0.10$  (annuals excluded)

BROWSE TRENDS --

Herd unit 16C , Study no: 2

T y p e	Species	Strip Frequency '97	Average Cover % '97
B	Amelanchier utahensis	1	.03
B	Artemisia tridentata vaseyana	3	.03
B	Cercocarpus montanus	18	.93
B	Chrysothamnus nauseosus albicaulis	5	.81
B	Chrysothamnus viscidiflorus stenophyllus	23	.76
B	Cowania mexicana stansburiana	1	-
B	Eriogonum microthecum	1	.03
B	Gutierrezia sarothrae	9	.06
B	Juniperus osteosperma	9	4.97
B	Opuntia spp.	4	.15
B	Pinus edulis	5	1.99
B	Purshia tridentata	30	5.79
B	Quercus gambelii	1	.00
Total for Browse		110	15.58

BASIC COVER --

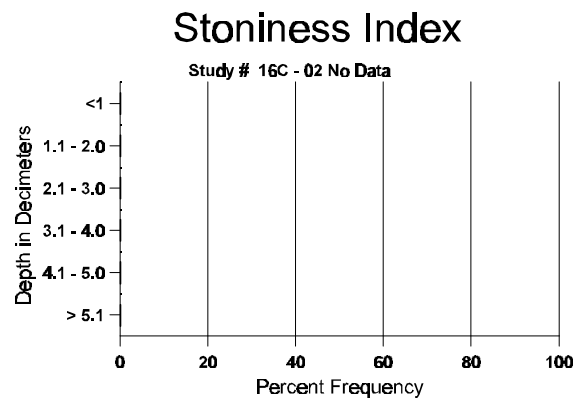
Herd unit 16C , Study no: 2

Cover Type	Nested Frequency '97	Average Cover % '89 '97	
Vegetation	329	8.00	33.14
Rock	160	9.00	6.12
Pavement	234	8.00	10.93
Litter	370	47.25	33.43
Cryptogams	82	0	1.17
Bare Ground	254	27.75	19.32

SOIL ANALYSIS DATA --

Herd Unit 16C, Study no: 02

Effective rooting depth (inches)	Temp °F (depth)	PH	%sand	%silt	%clay	%OM	PPM P	PPM K	dS/m
14.9	59.0 (14.9)	7.4	48.0	25.4	26.6	7.4	9.2	150.4	.5



PELLET GROUP FREQUENCY --

Herd unit 16C , Study no: 2

Type	Quadrat Frequency '97
Rabbit	19
Elk	8
Deer	56

## BROWSE CHARACTERISTICS --

Herd unit 16C , Study no: 2

A G R E	Y R	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4				
Amelanchier utahensis																		
Y	89	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	97	-	1	-	-	-	-	-	-	-	1	-	-	-	20		1	
M	89	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	0	
	97	-	-	-	-	-	-	-	-	-	-	-	-	-	0	13 17	0	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'89		00%			00%			00%			Appeared							
'97		100%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)														'89	0	Dec:	-	
														'97	20		-	
Artemisia tridentata vaseyana																		
M	89	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	0	
	97	-	1	2	-	-	-	-	-	-	3	-	-	-	60	18 26	3	
D	89	2	-	-	-	-	-	-	-	-	2	-	-	-	66		2	
	97	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
X	89	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	97	-	-	-	-	-	-	-	-	-	-	-	-	-	20		1	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'89		00%			00%			00%			- 9%							
'97		33%			67%			00%										
Total Plants/Acre (excluding Dead & Seedlings)														'89	66	Dec:	100%	
														'97	60		0%	
Atriplex canescens																		
M	89	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	0	
	97	-	-	-	-	-	-	-	-	-	-	-	-	-	0	22 19	0	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'89		00%			00%			00%			None							
'97		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)														'89	0	Dec:	-	
														'97	0		-	

A G R E	Y R	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4				
Cercocarpus montanus																		
Y	89	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	97	4	-	-	1	-	-	-	-	-	5	-	-	-	100		5	
M	89	-	-	3	-	-	-	-	1	-	4	-	-	-	133	8 9	4	
	97	2	9	3	-	1	1	-	-	-	16	-	-	-	320	25 34	16	
X	89	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	97	-	-	-	-	-	-	-	-	-	-	-	-	-	20		1	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'89		00%			75%			00%			+68%							
'97		48%			19%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'89	133	Dec:	-			
												'97	420		-			
Chrysothamnus nauseosus albicaulis																		
Y	89	1	-	-	-	-	-	-	-	-	1	-	-	-	33		1	
	97	-	-	-	1	-	-	-	-	-	1	-	-	-	20		1	
M	89	2	1	-	-	-	-	-	-	-	3	-	-	-	100	22 24	3	
	97	3	1	-	-	-	-	-	-	-	4	-	-	-	80	35 37	4	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'89		25%			00%			00%			-25%							
'97		20%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'89	133	Dec:	-			
												'97	100		-			
Chrysothamnus viscidiflorus stenophyllus																		
S	89	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	97	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1	
Y	89	9	-	-	-	-	-	-	-	-	9	-	-	-	300		9	
	97	14	-	-	-	-	-	-	-	-	14	-	-	-	280		14	
M	89	28	-	-	1	-	-	-	-	-	28	-	1	-	966	14 17	29	
	97	40	-	-	-	-	-	-	-	-	40	-	-	-	800	15 20	40	
D	89	4	-	-	-	-	-	-	-	-	3	-	-	1	133		4	
	97	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'89		00%			00%			05%			-23%							
'97		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'89	1399	Dec:	10%			
												'97	1080		0%			



A G R E	Y R	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4				
Cowania mexicana stansburiana																		
M	89	-	1	-	-	-	-	-	-	-	1	-	-	-	33	13	14	1
	97	-	2	-	-	-	-	-	-	-	2	-	-	-	40	24	18	2
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'89		100%			00%			00%			+18%							
'97		100%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'89	33	Dec:	-			
												'97	40		-			
Ephedra viridis																		
M	89	-	1	-	-	-	-	-	-	-	1	-	-	-	33	17	15	1
	97	-	-	-	-	-	-	-	-	-	-	-	-	-	0	21	40	0
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'89		100%			00%			00%			Died out							
'97		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'89	33	Dec:	-			
												'97	0		-			
Eriogonum microthecum																		
M	89	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	97	1	-	-	-	-	-	-	-	-	1	-	-	-	20	5	7	1
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'89		00%			00%			00%			Appeared							
'97		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'89	0	Dec:	-			
												'97	20		-			
Gutierrezia sarothrae																		
Y	89	8	-	-	-	-	-	-	-	-	8	-	-	-	266			8
	97	8	-	-	-	-	-	-	-	-	8	-	-	-	160			8
M	89	34	-	-	-	-	-	-	-	-	34	-	-	-	1133	9	11	34
	97	25	-	-	-	-	-	-	-	-	25	-	-	-	500	11	13	25
D	89	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	97	1	-	-	-	-	-	-	-	-	-	-	-	1	20			1
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'89		00%			00%			00%			-51%							
'97		00%			00%			03%										
Total Plants/Acre (excluding Dead & Seedlings)												'89	1399	Dec:	0%			
												'97	680		3%			

A G R E	Y R	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4				
Juniperus osteosperma																		
Y	89	5	-	-	-	-	-	-	-	-	5	-	-	-	166		5	
	97	4	-	-	-	-	-	-	-	-	4	-	-	-	80		4	
M	89	1	-	-	-	-	-	-	-	-	1	-	-	-	33	33	59	
	97	3	-	-	-	-	-	1	1	-	5	-	-	-	100	-	-	
X	89	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	97	-	-	-	-	-	-	-	-	-	-	-	-	-	80		4	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'89		00%			00%			00%			-10%							
'97		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'89	199	Dec:	-			
												'97	180		-			
Opuntia spp.																		
Y	89	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	97	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1	
M	89	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	
	97	6	-	-	-	-	-	-	-	-	6	-	-	-	120	4	5	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'89		00%			00%			00%			Appeared							
'97		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'89	0	Dec:	-			
												'97	140		-			
Pinus edulis																		
Y	89	2	-	-	-	-	-	-	-	-	2	-	-	-	66		2	
	97	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1	
M	89	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	
	97	4	-	-	-	-	-	-	-	-	4	-	-	-	80	-	4	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'89		00%			00%			00%			+34%							
'97		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'89	66	Dec:	-			
												'97	100		-			

A G R E	Y	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4				
Purshia tridentata																		
Y	89	-	1	-	-	-	-	-	-	-	1	-	-	-	33		1	
	97	3	-	-	-	-	-	-	-	-	3	-	-	-	60		3	
M	89	-	8	3	-	-	-	-	-	-	11	-	-	-	366	8 23	11	
	97	6	13	17	3	-	-	-	-	-	38	-	1	-	780	18 38	39	
D	89	1	3	-	-	-	-	-	-	-	3	-	1	-	133		4	
	97	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'89		75%			19%			06%			+37%							
'97		31%			40%			02%										
Total Plants/Acre (excluding Dead & Seedlings)												'89	532	Dec:	25%			
												'97	840		0%			
Quercus gambelii																		
S	89	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	97	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1	
Y	89	-	1	-	-	-	-	-	-	-	-	1	-	-	33		1	
	97	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
M	89	-	-	-	-	-	-	-	-	-	-	-	-	-	0	- -	0	
	97	1	-	-	-	-	-	-	-	-	1	-	-	-	20	20 26	1	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'89		100%			00%			00%			-39%							
'97		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'89	33	Dec:	-			
												'97	20		-			